| Surname | Centre Number | Candidate Number |
|---|---|---|
| Other Names | | 0 |

# GCSE

0237/01

# SCIENCE
## FOUNDATION TIER
## PHYSICS 1

P.M. FRIDAY, 15 June 2012

45 minutes

**Suitable for Modified Language Candidates**

| For Examiner's use only | | |
|---|---|---|
| **Question** | **Maximum Mark** | **Mark Awarded** |
| **1.** | **4** | |
| **2.** | **5** | |
| **3.** | **4** | |
| **4.** | **3** | |
| **5.** | **4** | |
| **6.** | **4** | |
| **7.** | **4** | |
| **8.** | **7** | |
| **9.** | **5** | |
| **10.** | **5** | |
| **11.** | **5** | |
| **Total** | **50** | |

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**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

**A list of equations is printed on page 2.** In calculations you should show all your working.

## EQUATIONS

power = voltage × current

energy transfer = power × time

units used (kWh) = power (kW) × time (h)

cost = units used × cost per unit

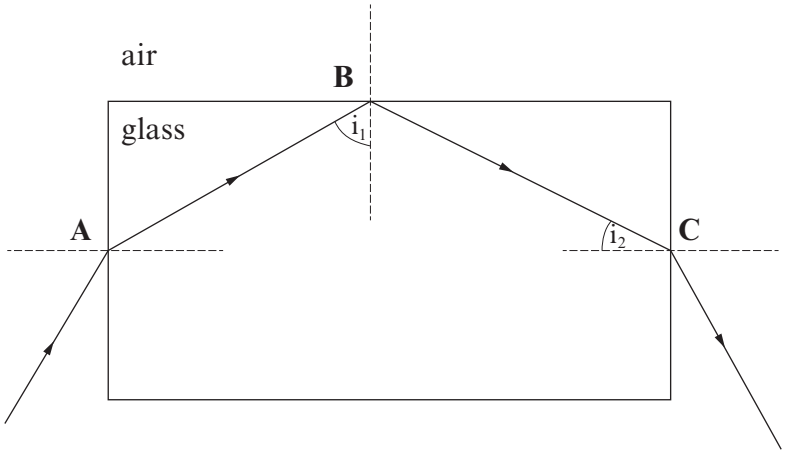
$$\%\ \text{efficiency} = \frac{\text{useful energy transfer}}{\text{total energy input}} \times 100$$

wave speed = wavelength × frequency

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

*Answer* **all** *questions.*

**1.** The diagram shows the path of a ray of light through a glass block.




Complete the following sentences. Underline the correct word or phrase contained in the brackets. [4]

*(a)* At **B** the light ray is [ refracted / reflected / totally internally reflected ] because angle $i_1$ is [ less than / equal to / more than] the critical angle for glass.

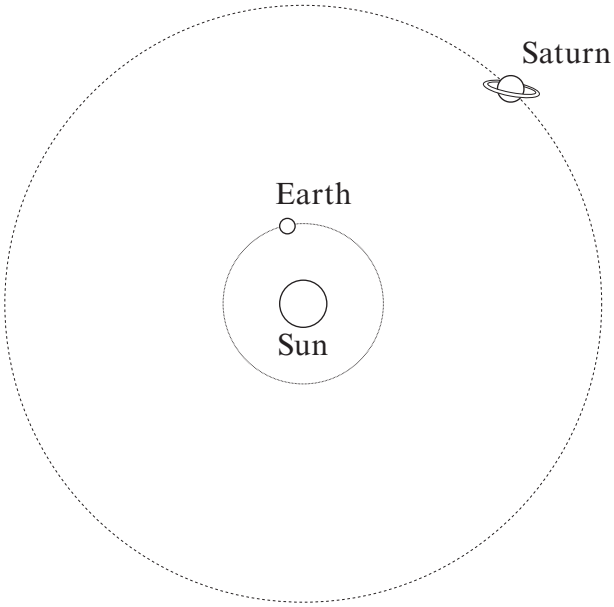
*(b)* At **C** the light ray is [ refracted / reflected / totally internally reflected ] because angle $i_2$ is [less than / equal to / more than] the critical angle for glass.



4

Examiner only

**2.** The diagram shows two planets in the Solar System in orbit around the Sun.
The diagram is not drawn to scale.




*(a)* Add to the diagram **the orbit** of planet Mars. [1]

*(b)* (i) Saturn is described as a Gas Giant.
Name another Gas Giant that exists in the Solar System ..... [1]

(ii) Give a reason why the temperature on the surface of Saturn is lower than that on the surface of Earth. [1]

.....

.....

.....

*(c)* (i) What is the Asteroid Belt?

.....

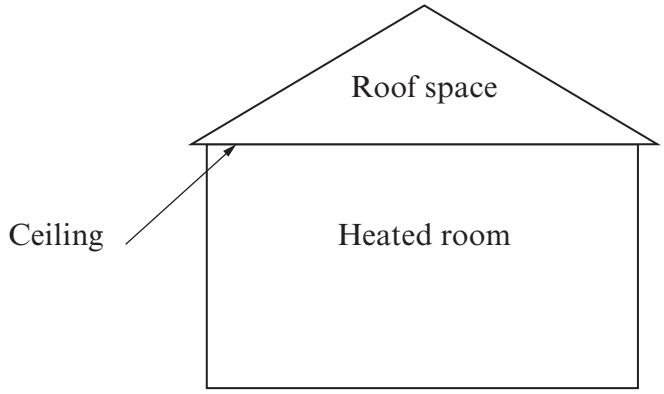
.....

(ii) Between the orbits of which two planets is the Asteroid Belt found?

..... and ..... [2]

5

**3.** Heat is lost from a room through the ceiling and the roof space.




*(a)* (i) Name the main process by which heat is lost through the ceiling.

.....

(ii) Name the main process by which heat is lost through the roof space.

..... [2]

*(b)* How does a thick layer of glass fibre on the floor of the roof space affect the heat loss through the ceiling of the room? [2]

.....

.....

.....

4

Examiner only

**4.** Electrical power is transmitted throughout the country at high voltage by the National Grid. It consists of a network of pylons, cables and transformers. These connect power stations together to factories and other users of electricity.

(i) Why is electrical power transmitted at high voltages?

.....

.....

(ii) How is a voltage of 230 V obtained from the National Grid to use in the home?

.....

.....

(iii) What is the advantage of connecting all power stations to the National Grid?

.....

.....

[3]

3

**5.** *(a)* State **two** ways that the gases emitted from coal fired power stations pollute the environment. [2]

1. .....

.....

2. .....

.....

*(b)* (i) Why do coal fired power stations need a plentiful supply of water?

.....

.....

(ii) Why do coal fired power stations need good transport links with the rest of the country?

.....

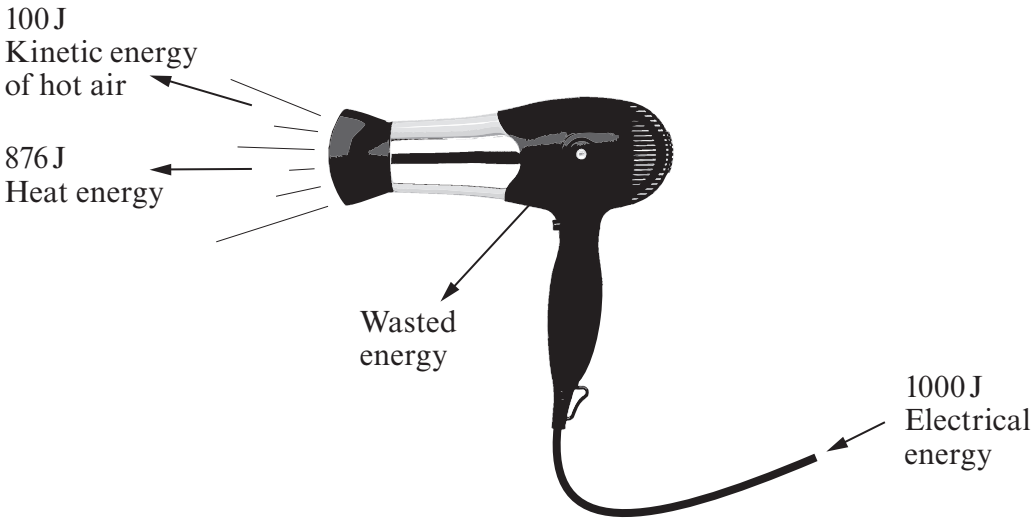
.....

[2]

4

Examiner only

**6.** The diagram gives information about the energy transfers in a hairdryer in each second.




*(a)* Calculate the amount of energy wasted in each second. [1]

Energy wasted = ..... **J**

*(b)* Use the equation

$$\% \text{ efficiency} = \frac{\text{useful energy transfer}}{\text{total energy input}} \times 100$$

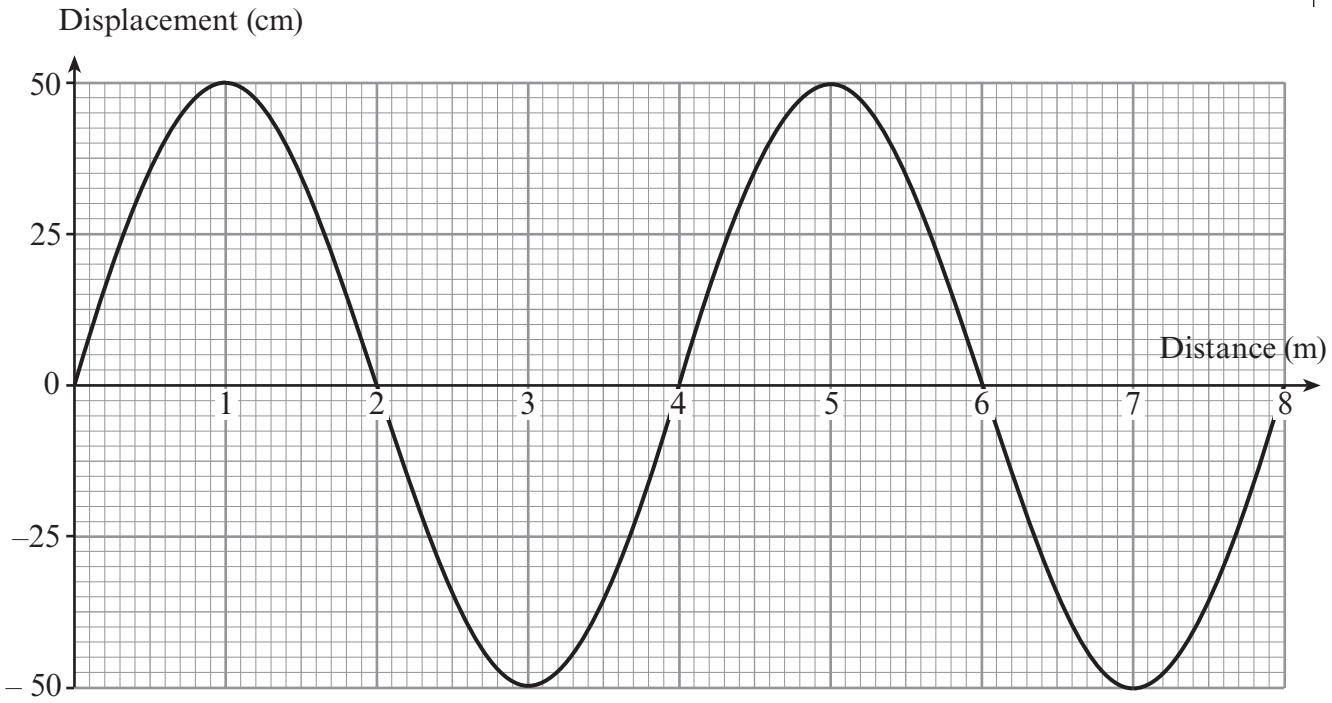
to calculate the efficiency of the hairdryer in **transferring electrical energy to useful energy in blow drying the hair**. [3]

Efficiency = ..... %

4

Examiner only

**7.** The diagram represents a water wave on the ocean.




*(a)* Write down the:

(i) wavelength of the wave; ..... m

(ii) amplitude of the wave. ..... cm
[2]

*(b)* The wave travels with a speed of 2.8 m/s along the surface. Use the equation

$$\text{frequency} = \frac{\text{wave speed}}{\text{wavelength}}$$

to calculate the frequency of the wave. [2]

Frequency = ..... Hz

4

Examiner only

**8.** A householder left home for a 14 day holiday. She left 5 filament lamps timed to come on for 5 hours a night. Each lamp had a power of 100 W.

*(a)* Calculate the total electrical power of the lamps in kW. [1]

Power = ..... kW

*(b)* Using the equations

number of units (kWh) = power (kW) × time (h)

cost = units used × cost per unit

(i) calculate the number of units (kWh) of electricity used during the 14-day holiday; [2]

Number of units (kWh) = .....

(ii) calculate the cost to the householder if electricity costs 8p per unit. [1]

Cost = ..... p

*(c)* A 20 W low energy lamp produces the same amount of light as a 100 W filament lamp.

(i) Why would the cost be less if the filament lamps were replaced by 20 W lamps? [1]

.....

(ii) Calculate the saving to the householder if 20 W lamps were used instead of the filament lamps. [2]

Saving = ..... p

7







**Turn over.**

Examiner only

**9.** Microwaves are a type of electromagnetic radiation. They are reflected from metals but can pass through glass, pottery and some plastics.

Most food cooked in a microwave oven has a high water content. This easily absorbs the microwave energy producing a rapid rise in temperature. This results in the food being cooked quickly.

*(a)* (i) Why is the choice of container for the food important in microwave cookery? [2]

.....

.....

.....

(ii) Why do microwave ovens cook food quicker than a conventional oven? [1]

.....

.....

.....

*(b)* X-rays and gamma rays are other types of electromagnetic radiation. State **two** ways in which they differ from microwave radiation. [2]

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.....

.....

5

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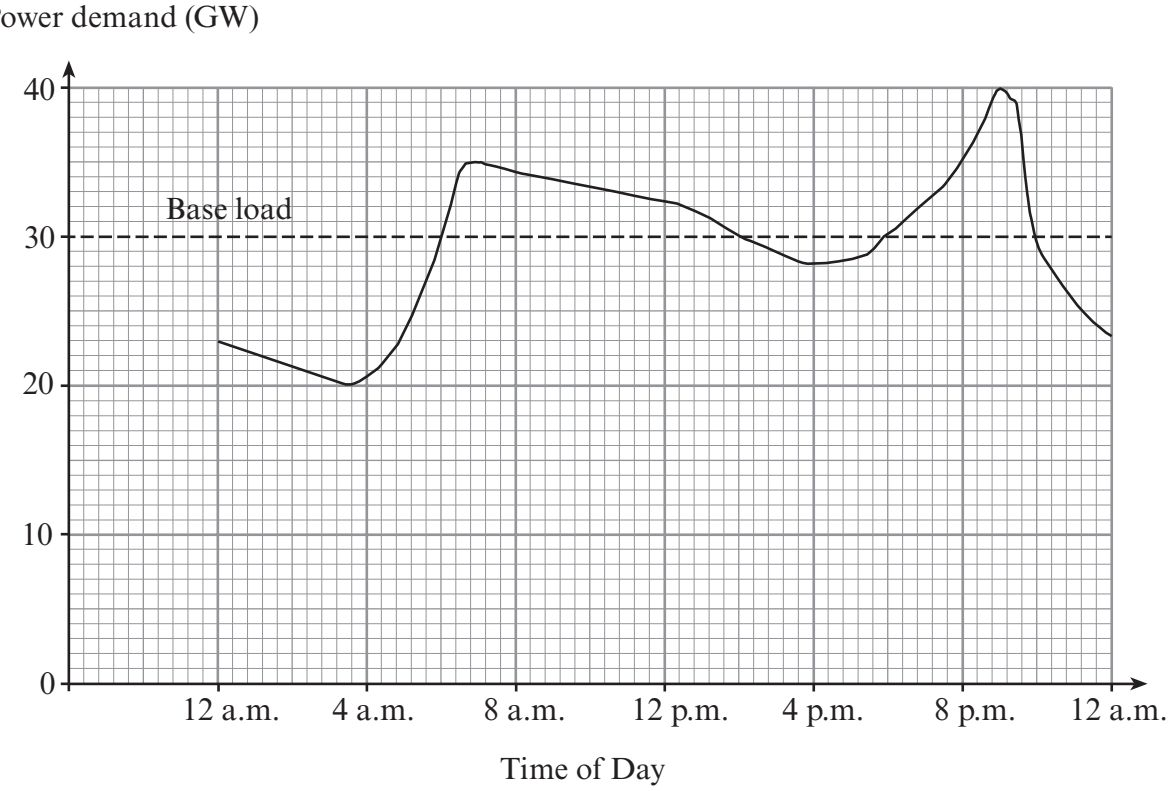
**10.** The graph shows how the demand for electricity changes over a 24 hour period, in this country, during winter.




Electrical power cannot be stored in large quantities. Most fossil fuelled and nuclear power stations are run continuously to provide a minimum amount of power to the National Grid. This is called the base load.
Most hydroelectric power stations only operate when there is peak demand for power. They have a much shorter start-up time than other power stations.

*(a)* (i) How many hours is the demand above the "base load" between 4 a.m. and 4 p.m.? [1]

Number of hours = .....

(ii) How much reserve generating capacity must the electrical industry have available, to meet the peak demand for the 24 hour period shown by the graph? [1]

Reserve capacity = ..... GW

*(b)* Why is electrical power offered at low cost between 12 a.m. and 5 a.m.? [1]

.....

.....

Examiner only

*(c)* Why does a hydroelectric power station have a much shorter start-up time than fossil fuelled power stations? [1]

.....

.....

*(d)* How does the electrical industry deal with the reduced demand for power during the summer months? [1]

.....

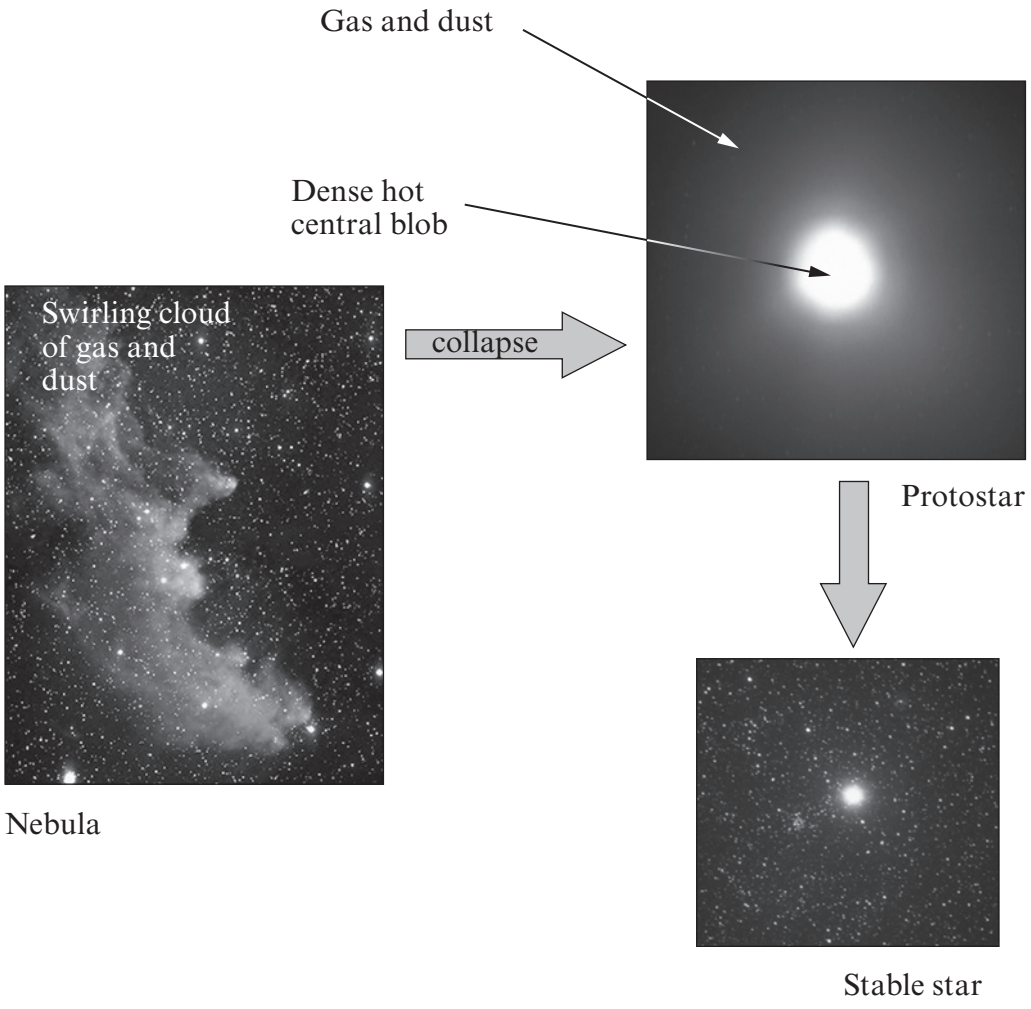
.....

5

**TURN OVER FOR QUESTION 11.**

Examiner only

**11.** The diagram shows the stages in the birth of a star. This takes place over many millions of years.




*(a)* What causes the gas and dust in the nebula to collapse? [1]

.....

*(b)* What happens in the core of the protostar to cause it to glow and produce a large outward radiation pressure force? [2]

.....

.....

.....

*(c)* What causes the protostar to eventually become a stable or main sequence star? [2]

.....

.....

.....

**THERE ARE NO MORE QUESTIONS IN THE EXAMINATION.**